FLYMASTER AVIONICS®

B1
User manual

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2008 FLYMASTER AVIONICS LTD.

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Warning

It is the sole responsibility of the pilot to operate the aircraft in a safe manner, maintain full surveillance of all flying conditions at all times, and not become distracted by the FLYMASTER B1. FLYMASTER AVIONICS is not responsible for any damages resulting from incorrect or no data provided by the FLYMASTER B1. Flight safety is the sole responsibility of the pilot.

It is unsafe to operate the FLYMASTER B1 while in the air. Failure by the pilot equipped with a FLYMASTER B1 to pay full attention to the aircraft and flying conditions while flying could result in accident with property damage and/or personal injury.

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1. Introduction

Thank you for choosing FLYMASTER B1. If you have any questions or comments regarding the use of our vario you can visit our website or contact our Support Department (support@flymaster-avionics.com)

2. Getting started

Fully charge battery before start using FLYMASTER B1.

Charging battery can be performed either by connecting the wall socket charger or the PC USB cable (both included in the package) to the B1 USB port located on the right side of the B1 (see Figure 1).

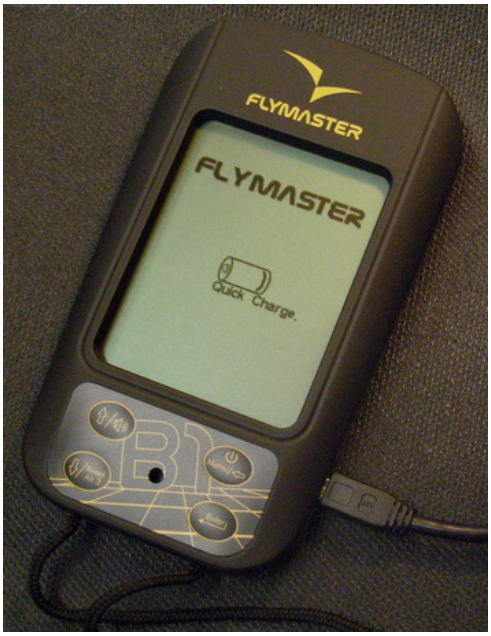

Figure 1 –Battery charge connection

The charging process is automatically stopped once the battery is fully charged. A message appears on the screen indicating the charging level and the end of the process. Note that the charger is capable of fully charging the battery in approximately 3 hours (quick charge), whilst the USB connecting may take up to 15 hours (slow charge).

B1 uses a Lithium-ion polymer battery, which is not prone to "memory effect", so the battery does not need to be totally discharged before recharging. Full charge lasts for over 20 operating hours, but recharging before each flight is strongly recommended.

2.1. The Keys

Figure 2 –FLYMASTER B1 keyboard

Four keys are used to interact with FLYMASTER B1 (see Figure 2). Each key may have more than one function, depending on the context. Functions are represented on the keys by a graphic or a word. All functions are listed on the Table 1.

Table 1 – Keyboard Functions

Key	Functions
S1	**Power/Menu** – turns the B1 On; starts settings menu; exits settings menu; moves back in selected items
S2	**Enter** – use to confirm all actions
S3	**Up/Volume** – moves cursor up when in settings mode; changes vario volume when in flight screen
S4	**Down/Reset Alt.3** – moves cursor down when in settings mode; resets altimeter 3 when in flight screen

In *Flight Mode* three of the keys directly access specific functions, namely, changing vario volume (see section 4), Resetting Altimeter 3 (section 5), and switch to Settings Mode menu. In *Flight Mode* mode S2 has no function allocated to it.

As mentioned above, to access the *Settings Menu* from with in the *Flight Mode* screen, briefly push the S1(menu) key, this will display the *Settings Menu*. To return to Flight mode briefly push the S1(back) key again.

Once in the *Settings Menu* the S3(up) and S4(down) keys may be used to scroll through the Settings Menu items. To edit items in the selected Settings Item push the S2(enter) key, by doing so B1 goes into *Settings Edit* mode.

In *Settings Edit* the S2(enter) key moves to the next setting field, whilst the S1(back) key moves to the previous setting field. The selected field's value can be changed by pushing the S3(up) or S4(down) keys. Keeping the S3 or S4 keys pressed will automatically changing the field's value, the speed of change will gradually increase.

When the S2(enter) key in pushed on the last field of, changes made are confirmed and B1 returns to Settings menu mode. On the other hand if the S1(back) key is pushed when on the first settings field, changes to fields are restored and B1 goes back to *Settings Menu* mode.

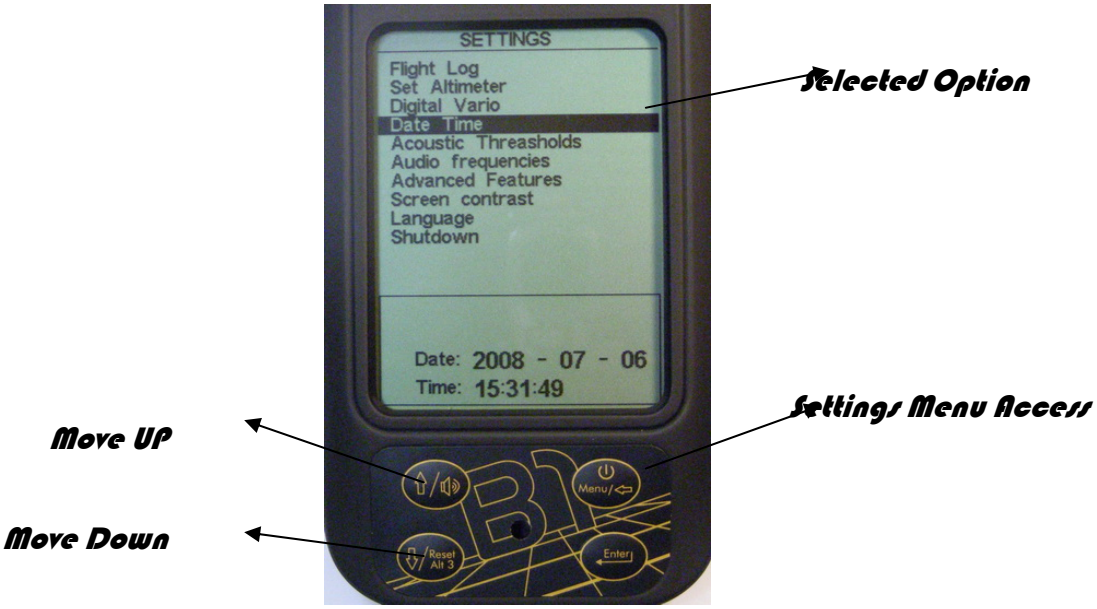

Figure 3 –Settings Menu Mode

2.2. Turning the Unit On and Off

To turn on the B1, briefly push the S1 key, this will display the start up screen. A 10 second countdown will start, push the S2 (Enter key) to confirm power up before time is elapsed

Turning of the B1 is made by selecting "Shutdown" on the settings menu mode. This is done by briefly pressing the S1 key, then using the S3 (up) or S4 (down) keys to select "Shutdown" option, and then pressing S2 (Enter key).

The flight timer will start automatically whenever the altitude varies more than 5 meters. The timer stops when the B1 is turned off. When a flight is started, data collected during flight time is automatically recorded in the internal memory.

3. Understanding the Flight Screen

The FLYMASTER B1 has a high resolution (320x240) and contrast display. This allows it to show more useful information simultaneously. The flight screen can be seen in Figure 4. Each field has a self explanatory text tag.

3.1. Altitude graph

The FLYMASTER B1 has an altitude graph. Whenever the flight starts a line is draw representing the altitude versus time. Altitude is represented in the vertical axis, and time in the horizontal axis.

The scale of the horizontal axis is fixed and corresponds to 2 minutes. This means the plot will always represent absolute altitude of the last 2 minutes of flight.

3.2. Temperature

The field above the altitude chart indicates the ambient temperature in *ºC* or *F* with a resolution of 0.1 ºC. The temperature sensor is located inside the B1, so a time delay can be expected between any ambient temperature change and the displayed value.

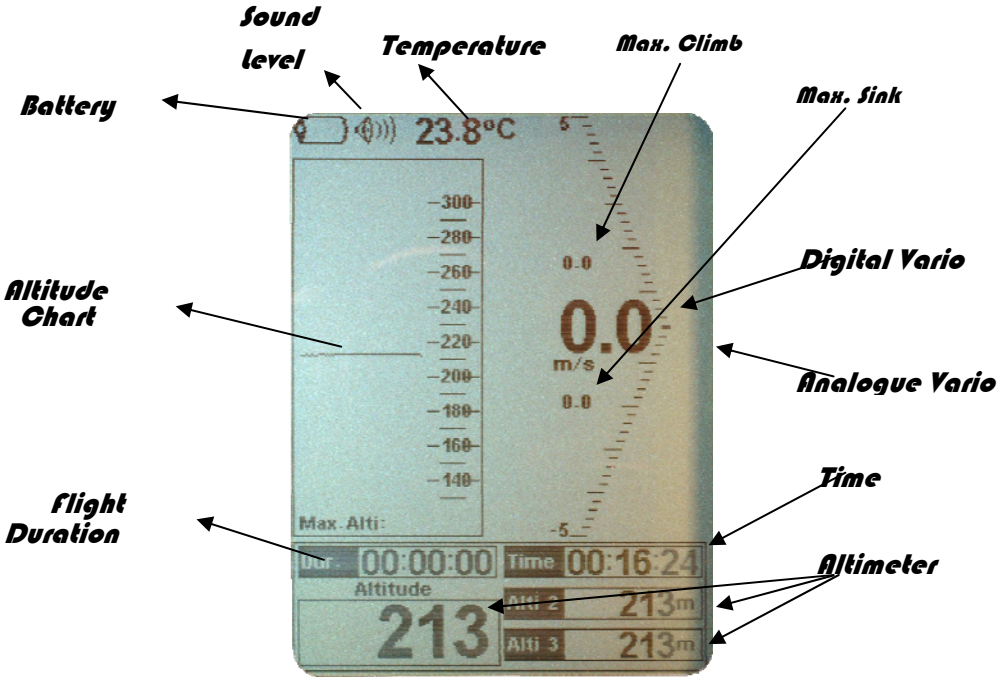

Figure 4 – Flight Screen

3.3. Flight Duration

The FLYMASTER B1 has a timer that indicates the flight duration in Hour:Minute:Second. The timer is started once an altitude variation of ±5 meters is detected, and is stopped when the B1 is turned off. The data collected after the timer starts is automatically recorded in the internal memory.

3.4. Altimeters 1,2 and 3

The "altitude" field indicates the absolute height in *meters* or *feet* depending on the setting. This altitude corresponds to the barometric altitude and thus depends totally on the QNH (absolute pressure at a given moment and location in regards to the correspondent pressure at MSL – mean sea level - at same moment) for a given moment.

Altimeter 3 can be quickly set to 0 by pushing S4 key when the flight screen is active.

3.5. Sound Level

The sound level symbol indicates the current sound volume. As explained in section 4 the B1 volume can be adjusted according 4 levels. The sound level symbol corresponds to a small speaker and a specific number of sound wave lines. The number of wave lines varies according to the volume level. In this way, three lines correspond to the maximum volume.

When the sound is muted a cross symbol appears next to the speaker icon.

3.6. Time

The "Time" field indicates time in Hour : Minute : Second. The time can be set by the user on settings menu.

3.7. Digital and analogue variometer

The instant vertical speed is indicated by a bar which corresponds to the analogue variometer. The bar is scaled from -5 m/s to +5 m/s. Values between ± 10 m/s are also indicated as when the vertical speed increases, or decreases, the bar is filled proportionally until the full scale value (±5 m/s) is reached, and then, for higher values (ex. ±6, ±7...), the bar is cleared from the bottom up until being completely empty at ±10 m/s.

Adjacent to the analogue variometer there are two digits that correspond to the digital variometer. The resolution of the digital vario is 0.10 m/s and the full scale is reached at ±99 m/s.

The digital variometer differs from the analogue variometer, in that the values are averaged to a set time base of the. This time base is factory defaulted to 10 seconds, but may be defined by the user (see section 6.3). For this reason the digital variometer is called the integrated variometer. The integrated variometer is particularly useful in determining the actual strength of a bumpy thermal.

3.8. Maximum and Minimum vertical speed

Above and below the digital variometer there are two smaller figures. These are constantly updated and represent the maximum positive and negative vertical speeds since the flight has started. The saved values correspond to the integrated vario, so they depend on the integration time defined by the user.

The figure above the digital vario value corresponds to the maximum rate of climb, and the figure below the digital vario to the maximum rate of sink. These values are automatically reset once when the B1 is turned off.

4. Adjusting sound volume

The volume of the acoustic vario can be changed directly using the S3 key. The B1 has 4 volume levels approximately corresponding to the values of the following table.

Table 2 – Sound Volume Levels

Level 3	High
Level 2	2/3
Level 1	1/3
Level 0	Off

Whenever in the flight mode screen, pushing the S3 key for more than 2 seconds will cause the volume level to be decreased according Table 2. The B1 will beep 5 times to demonstrate it's current sound level. When level 0 is reached an arpeggio sound is played. When the sound is at level 0, pushing the S3 key for more that 2 seconds will set the volume to level 3.

5. Resetting Altimeter 3

When in flight mode, Altimeter 3 can be rapidly set to 0 by briefly pushing S4 key. This is useful for creating a reference altitude marker during a flight. For instance, if you reset the Altimeter 3 upon entering a thermal, you can easily monitor the total altitude gain in that thermal.

6. Settings

Almost all the FLYMASTER B1 parameters can be adjusted using the settings menu. By changing parameter values the user can easily adapt features as the variometer acoustics, time, or display contrast, just to name a few. The menu can be accessed by pressing the S1 key for more than 1 second.

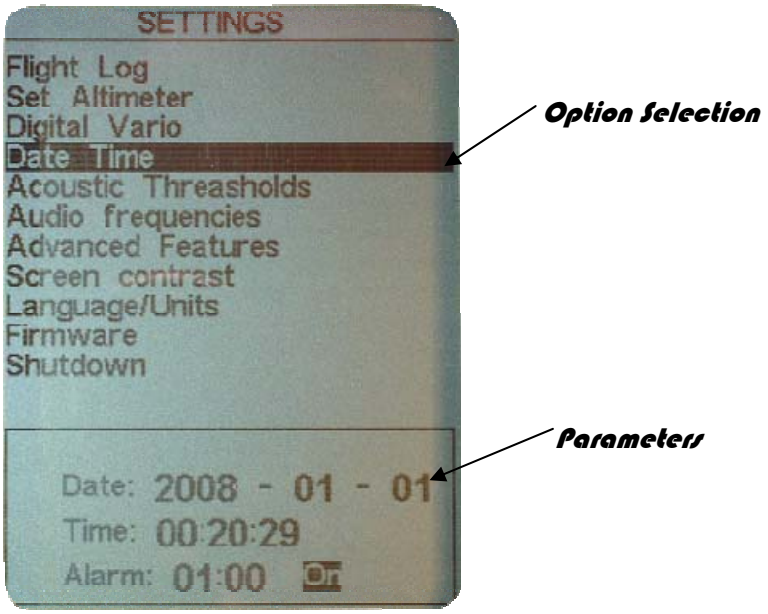

Figure 5 –Settings Menu Options

The settings menu screen is divided in two parts (see Figure 5). The top one shows all the settings menu options. Menu option can be changed by pressing S3 and S4 keys. The current menu option is always highlighted and for most of the options his parameters can be seen on the bottom part of the screen.

A highlighted option can be accessed by pressing S4 key (Enter key).

6.1. Flight Logger

The Flight Logger option allows the user to access information about previews flights. In the top of the screen a list of flights is showed. Each flight is identified by the take off date and time.

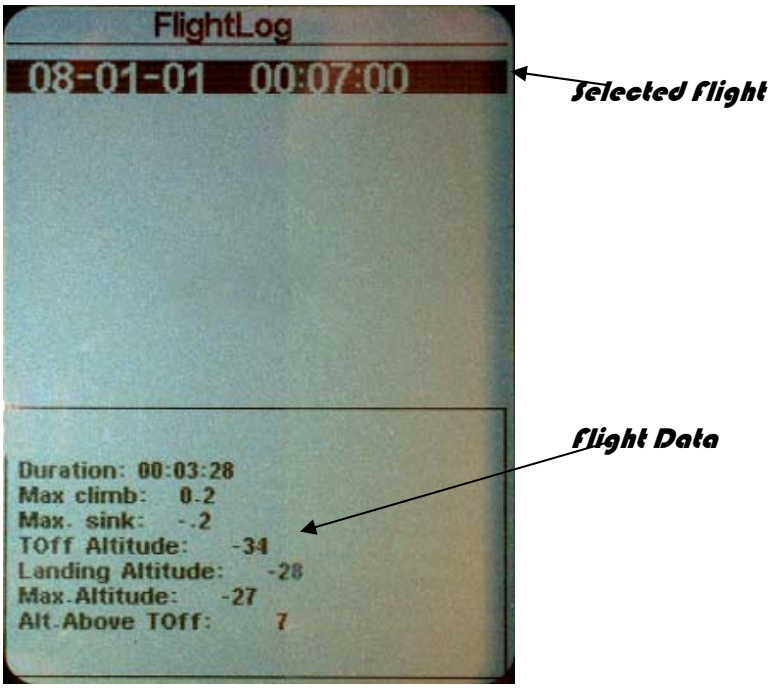

Figure 6 –Flight Logger

Flights can be chose by using S3 and S4 keys. For each flight the flowing information is displayed:

- Duration – Flight duration
- Max Climb – Maximal climbing rate
- Max Sink – Maximal sinking rate
- TOff – Take Off altitude (altimeter 1)
- Landing Altit – Landing altitude (altimeter 1)
- Max. Altitude – Maximum altitude during flight (ASL).
- Alt. Above TOff – Maximum altitude above Take Off.

More information will be showed in future firmware versions.

6.2. Set Altimeter

The ”Set Altimeter” option allows the user to change the current altitude values for each of the 3 available altimeters.

The altimeter to be adjusted can be choose pressing S2 (Enter) key. Once the desired altimeter is highlighted, the value can be changed using S3 and S4 keys.

6.3. Digital Vario

In section 3.7 we have presented the Digital Vario. This vario, also called integrated vario, indicates the average climbing rate during a configurable period of time, named integration time base. This time base can be defined by the user in the "Digital Vario" menu option.

After pressing S2 (Enter) key, the integration time base can be changed using S3 and S4 keys.

The Digital Vario is preset at zero, and will have a slower response if higher integration values are selected.

6.4. Date and Time

The Date and Time menu option allows the user to set the internal B1 time and date. This value is used to identify each flight log. Since Firmware version 1.19 this option allows also to set an alarm. The alarm can be useful to wake up in the morning dreaming with a good thermal. .

Figure 7 – Date and Time

In order to set the time and date the user should press the S2 key. Each time the S2 key is pressed a value is highlighted in the following sequence: year, month, day, hour, minute, second. The highlighted value changes if S3 and S4 keys are pressed.

The alarm can be set in the same manner, namely pressing the S2 key to highlight the hour, minute or On/Off, and then the S3/S4 key to change the value.

Regarding the alarm, when the hour previously specified is reached a beep... beep... sound will be eared as we were in a strong thermal. The backlight will also flash. The alarm can be stopped or snoozed by pressing S1 and S2 key respectively.

6.5. Acoustic Thresholds

The user can change the climbing and sinking rate sound trough the respective threshold values. These thresholds correspond to the climbing and sinking rates at which sound activates.

The sinking threshold is set to -2 m/s by default. The value can be changed by pressing the S2 key when the "Acoustic Thresholds" option is highlighted on the settings menu. This action will highlight the "climb" threshold which can be changed using S3 and S4 keys to increase and decrease the value. Confirmation should be made by pressing S2 key, which at the same time highlights the "sinking" threshold, and same procedure can then be used to adjust the sinking threshold.

6.6. Audio Frequencies

The "Audio Frequencies" settings menu option allows the user to adjust the vario tone to his preference, by adjusting the "Base Frequency" and "Frequency Increments".

The "Base Frequency" is the first frequency used to produce the initial sound which corresponds to the climb threshold, usually 0.1 m/s. Later, as the climb rate increases, a bip, bip sound is produced for which the cadence and frequency also increase. The "Base Frequency" can be set between from 500 to 1500 Hz. The higher is the frequency value, the more strident is the sound.

The "Frequency Increments" parameter sets the frequency increment for each 0.1 m/s climb rate increase. The "Frequency increments" can be set from 1 to 100 Hz.

The pre-set values for "Base Frequency" and "Frequency Increments" are respectively 600 Hz and 10 Hz.

In order to change the base frequency value press S2 key after "Audio Frequencies" menu option is highlighted. This action will highlight the "Base Frequency" value so it can be increased using S3 key or decreased using S4 key. S2 key should then be pressed, thus confirming the "Base Frequency" setting and highlighting the "Frequency Increments" option.

The same procedure can be used to change the "Frequency Increments".

6.7. Advanced Features

The advanced features settings option can be used to adjust the B1 acoustics to the user preferences. Using these features the user can turn the vario sound more or less responsive, and can also turn on and off the buzzer functionality.

There are following four advanced features:

6.7.1. Damper

The damper determines the relation between climb acceleration and sound frequency increase. Higher values turn the B1 more stable and thus having a slower response to increased climb rates. Lower values make the B1 be less stable and respond faster.

B1 is preset at a Damper value of 8.

6.7.2. Cadence

Cadence can be set to 0 or 1. When set to 0 will cause the beeping cadence to beep slower initially and speed up faster later, wile when set to 1 will cause B1 to beep faster at the beginning but evolve slower. The Cadence preset value of the B1 is 1.

6.7.3. Dynamic Frequency

Dynamic Frequency can be set to "On" or "Off". When on the sound frequency may change during a beep, otherwise the frequency will be steady. Standard value for dynamic frequency is 1.

6.7.4. Buzzer - Next to Climb Indicator

B1 features a next to climb acoustic indicator, which is an important FLYMASTER development in detecting weak lifts. This indication can be set to be always On, or to start only when an altitude variation of ±5 meters is detected (see section 6.7.5).

A usual vario starts beeping when the pilot experiences a certain climb speed, for example *0.1 m/s*, and this will not happen until the air is rising at a higher rate than the glider sink rate. In these conditions, typically the air must be rising at more than *1 m/s* before the usual vario makes the first beep.

The B1 can be set to release acoustic information well before that, when just about next to climbing. The "Next to Climb Indicator" helps the pilot to detect rising air starting from *0 m/s*. The "Buzzer" parameter is used to calculate the value at which the vario starts to "buzz". This value is subtracted from the Climb Threshold. Consider the following example were the Climb Threshold is 0.1 m/s and Buzzer is 3.

Climb Threshold = 0.1 *Buzzer = 3*

0.1–0.3 = -0.2 m/s

In this case B1 will start to buzz when the pilot's vertical velocity is greater than *-0.2 m/s*, i.e. at *-0.19999 m/s* and over. Naturally, the B1 will make the usual beep... beep... after the climbing threshold is reached, which in this example is *0,1 m/s*.

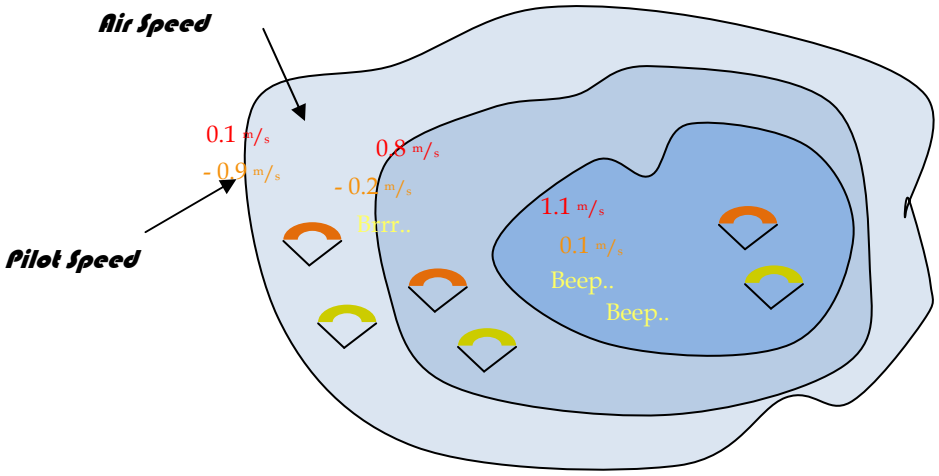

Figure 8 – Next to Climb Indicator

A practical example of the buzzer feature can be illustrated using Figure 8. In this example the sinking rate relative to air for both paragliders is *1.0 m/s*. The orange paraglider has a FLYMASTER B1 for which the climbing threshold is set to *0.1 m/s* and the Buzzer parameter is set to *3*. The green paraglider has usual vario for which the climbing threshold is set to *0.1 m/s*.

As shown in the figure, when both pilots enter the thermal nothing is heard. The air is rising at *0.1 m/s* but both pilots are descending at *-0.9 m/s*. In the second level of the thermal the air is rising at *0.8 m/s* and so pilots are descending at *-0.2 m/s*. At this stage the orange pilot starts to hear the Next to Climb brrrrr sound of his FLYMASTER B1, which helps him to centre the thermal, while the green pilot is still not aware by his instrument. Finally, in the 3 level the air is rising at *1.2 m/s* and so both pilots climb at *0.2 m/s*. The FLYMASTER pilot starts to hear his vario beep... beep... sound, and that's only when the green pilot hears the first beep from his instrument.

It is obvious how the Next to Climb indicator can be a major help to anticipate thermal detection, or "survive" in very weak conditions.

The Next to Climb Indicator can be turned off by simply setting the buzzer to 0. B1 will then act as a usual vario.

6.7.5. Auto Silent

As mentioned in the previous section the "next to climb indication" also know as the "buzzer" produces a sound when the vertical velocity is in the buzzer range. This means that when pilot is on the ground the buzzer sound will be constantly audible, which can be irritating. When "Auto Silent" parameter is set to "On", the buzzer will remain quiet until the start of flight, which is determined by a variation in altitude of +-5 meters. Conversely when set to "Off" the buzzer will be audible even before "start of flight".

6.8. Screen Contrast

The screen contrast menu allows changing of the display contrast. The contrast level is shown trough a sliding bar. The bar can be moved to the right using the S3 Key. This action will turn the screen darker. Inversely, the bar can be moved to the left using S4 key which will turn the screen to be lighter. After selection, the new setting must be confirmed using S2 key.

6.9. Language and Units

The "Language" menu option allows the user to change the B1 interface language. In order to do that the user should press S2 (Enter) key, and then use S3 and S4 keys to chose the desired language. In the end the choice should be confirmed pressing S2 key.

After the S2 key is pressed the Units parameter is highlighted. Then the units system can be changed from SI to English System using S3 and S4 keys. The choice should be confirmed pressing the S2 Key.

6.10. *Firmware*

Since Firmware version 1.19 that the B1 firmware can be updated very easily using this menu option. In order to update your B1 please see section 7.

6.11. Shutdown

The Shutdown menu option is self explanatory. Once this option is highlighted and the S2 key is pressed, the B1 is turned off.

The B1 has automatically saved all flight data before it had been turned off.

7. Updating B1 Firmware

As new features are added to the B1 firmware, we provided a menu option that turns this procedure very simple.

The first step of the updating procedure consists of installing the USB drivers on the PC. In order to do that you should connect the B1 to the PC and follow the windows instructions to install the driver. You can download the drivers on our website as also an installation manual ("How to install B1 driver on Windows XP.pdf").

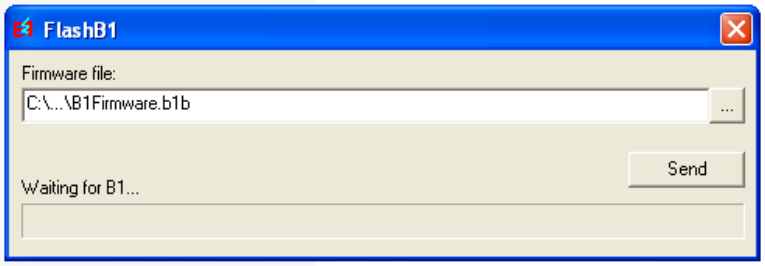

Figure 9 – FlashB1 software

Once the driver is correctly installed use the following procedure.

1- Connect the B1 to your PC using the cable supplied. Some windows information should be given saying that a new hardware is present a ready to use.

2- Download and execute the FlashB1 (FlashB1.exe) application. You will probably receive a security warning from windows about the application.

3- Browse for the B1 firmware previously download from our website.

4- Click "send" bottom. You should see something like in Figure 9 saying that the application is waiting for B1.

5- Then enter in the menu of B1 and choose the Firmware option.

6- Press S2 key in order to highlight the "No" word corresponding to the "Update Now" parameter.

7- Use the S3 or S4 key in order to change the "No" to "Yes" and then press the S2 key to confirm the option

If everything is ok then a message in the B1 screen and flashB1 software appears saying that the B1 is updating. You should wait untill process ends and the B1 starts to function normally.

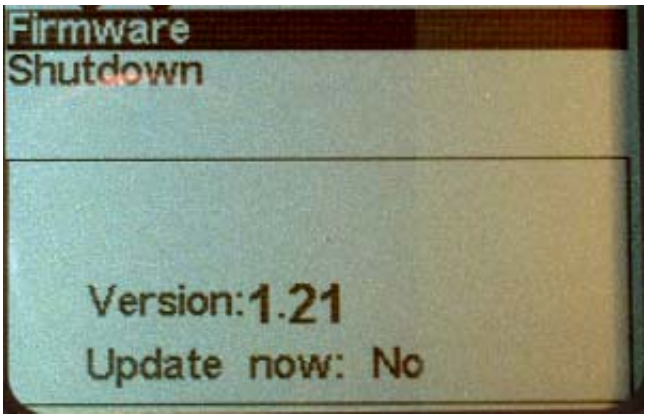

Figure 10 – Firmware menu option